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PROTECTION AND MANAGEMENT OF LAND RESOURCES: OPTIONS FOR AGENDA 21

Report of the Secretary-General of the Conference

I. INTRODUCTION

1. This paper was prepared in response to the decision 2/5 of the Preparatory Committee at its second session, on the Report of the Secretary-General of the Conference, in which the Secretary-General was requested "...to continue to develop the proposals on 'Agenda 21' for discussion at its third session, taking into account the views expressed in the discussion and the conclusions of the regional preparatory conferences". The paper also responds to decision 2/11 on protection and management of land resources, which welcomed the proposals for the development of an integrated approach to the protection and management of land resources...and requested the Secretary-General... to develop these...proposals further..."

2. In complying with this request, the Secretariat of the Conference has identified a number of actions that could be used as a contribution to Agenda 21, and which respond to the main issues which have been discussed in relation to land resources in background papers at both the past and current session of the Preparatory Committee. These include the application of an integrated approach to the protection and management of land resources (A/CONF.151/PC/24 and A/CONF.151/PC/61); combating desertification and drought and other forms of land degradation (A/CONF.151/PC/62); the promotion of sustainable agriculture (A/CONF.151/PC/26 and A/CONF.151/PC/); and alternative sustainable systems of production (A/CONF.151/PC/25).

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3. Land is defined as a complex system, and includes its topography, dimensions and spatial nature; its soils, minerals, water and biota. Biota includes plants, animals and microorganisms in all their diversity. Land and its components are organized in terrestrial ecosystems which provide a variety of functions and services, such as the breakdown of wastes, the formation of soils, the moderation of water flows or the pollination of plants. Land and land related processes are also an important component of the global biogeochemical cycles, and, as such, linked to global climate, the weather and other atmospheric phenomena.

LINKAGES BETWEEN LAND RESOURCES AND OTHER ENVIRONMENT AND DEVELOPMENT ISSUES

4. The identification of interactions and linkages between land and the components that form it, as well as with the various economic and social factors and with the cross-sectoral issues is important because it allows to determine which are the main areas where problems lie and where remedial action must be addressed. The most important of these has been described elsewhere in somewhat greater detail (see document on Protection and Management of Land Resources: The Elements of an Integrated Approach A/CONF.151/PC/63). Suffice it to say here that, when proposing options for the development of Agenda 21, the links between land resources and other environmental, social and economic issues have been addressed.

5. Because of its complexity and systemic nature, land resources should be considered in an integrated manner, as this is the only way in which interactions and linkages can effectively be addressed. Considering the land system as a whole at the conceptual and planning level does of course not preclude that, at the management level, land resources may be subdivided into various discrete sectors for the sake of convenience, (e.g. forests or water) or a combination of these, as occurs in economic activities such as agriculture.

6. Following this pattern, papers before the Preparatory Committee deal with the various land based resources on an issue by issue basis, but on the assumption that the overall approach to land resources would most appropriately be integrated. Also the programmes for each of these resource areas would have to be integrated and coordinated at the time of implementation. At present, there is a considerable overlap in proposed programmes, but this has been cross-referenced.

II. OPTIONS FOR AGENDA 21

7. Because of the nature and breadth of the land resources issue, many of the essential programmes that will contribute to reaching the issue-wide goals are presented elsewhere, as is the case for forests, water and biological diversity in particular.

LAND RESOURCES WIDE OBJECTIVE

8. The broad objective for land resources is to protect and manage the land system so that it provides the resources, goods and services to satisfy human needs in a sustainable manner. This entails the management of both the land

as a system as well as of the individual resources that constitute it. The specific goals for individual land resources include the protection of soils from loss and degradation to ensure their continued productivity; those concerning water, forests and biological resources and diversity, are dealt with elsewhere.

PROPOSED PROGRAMME AREAS

9. The present document suggests, for the consideration of the Preparatory Committee, options for action in three major clusters of programmes, namely:

a. PROTECTION AND MANAGEMENT OF FRAGILE ECOSYSTEMS

b. INTEGRATED APPROACH TO PLANNING AND MANAGEMENT OF LAND RESOURCES

c. SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT

10. Each of these clusters of programmes areas will contribute to the achievement of one or more of the Land Resources goals, in the same manner that programme areas for water, forests and biological diversity will also contribute. In turn, the programmes presented here will assist in the achievement of the goals for those areas. Within each of the major clusters presented below a number of subprogrammes and activities will need to be undertaken.

A. PROTECTION AND MANAGEMENT OF FRAGILE ECOSYSTEMS

Basis for Action

11. Fragile ecosystems, such as arid lands, mountains or certain coastal areas, are important ecosystems, with unique features and resources. Some, such as mountains or wetlands provide important services to areas far removed from the immediate ecosystem. They are areas of important cultural diversity and storehouses of valuable indigenous knowledge. Together, in spite of the fact that they are sparsely populated, they are the home to a substantial proportion of the earth's population and provide varied opportunities for human livelihoods. Yet because many of these areas have a limited productivity, or are marginalized politically, they have not received the attention they merit. This is something the proposed programme seeks to remedy.

12. In spite of the general lack of attention, a number of initiatives already address, or are being planned to address, the issue of protection and management of fragile ecosystems. These include the United Nations Plan of Action to Combat Desertification or the Wetlands Programme of the IUCN in the first category, or the Mountain Agenda currently being prepared by a consortium of interested organizations in the second. The subject of coastal area management is dealt with at length in the Agenda for Oceans. Options for action could be based on these programmes. The general options presented at this stage will be spelt out on the basis of the Preparatory Committee's discussion on desertification and coastal areas in this session.

Objectives

13. The broad objective for fragile ecosystems is to manage the development process so as not to harm the resource base but to preserve, protect, rehabilitate and enhance the ecosystem and natural resources so that they can satisfy human needs on a sustainable basis.

Activities

14. As stated, only the most general strategic directions will be defined here, with the understanding that they can be further developed later on the basis of the results of the current initiatives. The main focus could be the simultaneous protection of the resource base and the management of the development process through:

a. building up the knowledge and information base;

b. management of the development process in ways that do not damage the prospects for sustainability;

c. rehabilitation of damaged environments;

d. preservation of areas of special interest or important functions;

e. building up the institutional basis;

f. development of human resources;

g. pilot projects that refine and test the feasibility of implementing sustainable development strategies that combine environmental protection and development functions;

B. INTEGRATED APPROACH TO PLANNING AND MANAGEMENT OF LAND RESOURCES

Basis for Action

15. Land resources are used for a variety of purposes which interact and may compete with each other, therefore it is desirable to plan and manage all uses in an integrated manner. Integrated consideration facilitates appropriate choices and trade offs, thus maximizing sustainable productivity and use. Opportunities to allocate land to different uses arise in the course of major settlement or development projects or in a sequential fashion as lands become available on the market. A number of techniques and processes can be combined to facilitate this integrated consideration. Many of its elements already exist, but need to be more widely applied, further developed and strengthened.

16. The most important strategic directions that could be pursued are described below. The initiatives and programmes flowing from these strategic directions include work on both the theoretical and practical aspects, and can be carried out by national Governments and with the assistance of the international community. The description is of a very general nature for the moment, in order not to preempt the various current initiatives both within the preparatory process, as well as in association with it, to develop various

of these elements into full fledged programmes. Among these, one can mention work on assessment and information systems, economic instruments, legal measures, land use planning for agriculture and settlements and others.

Objectives

17. The broad objective is to facilitate allocation of land to the uses that provide the greatest sustainable benefits. This would require to set in motion a process that allows to bring together in a common framework all the different elements that make this possible. This includes the building up of the base of knowledge and information on land resources and their sustainable use; the development of appropriate institutions and policy instruments; putting in place incentive systems for better land use; the development of responsive planning and management structures and approaches; further development of the tools to support the planning and management system; the development of the necessary human resources to carry out these tasks, and finally, providing adequate financial resources.

Activities

18. A variety of options are available for actions and activities that can contribute to the achievement of the broad objectives and goals described. While they are here described at the level of activities, it is apparent that these options could each be developed into full fledged programmes. In fact, a number of initiatives and major programmes already exist in these areas or are in the process of being developed. To name just one example, the Global Environment Monitoring System (GEMS) of the United Nations, which contributes data to the information base on land resources and the Global Resources Information Database (GRID). The main options for action fall within the following categories:

19. Understanding the land resources system and the implications for sustainable development of land resources is the basis for making wise decisions in this area and for ensuring that the uses and management practices are indeed sustainable over the long term. The main route to accomplishing this is through research and pilot projects. Various elements could be included:

a. clarification of ecosystemic interactions and interactions between land resources and social, economic and environmental systems;

b. development of specific indicators of sustainability; development of a composite index of sustainability; research and evaluation of the operational significance of the indicators of sustainability and translation into management techniques;

c. definition of the environmental, economic, social, cultural and political determinants of sustainability in local circumstances.

20. Development of more appropriate institutions and policy instruments is the key prerequisite for setting in motion and institutionalizing the process of approaching land resources issues in an integrated manner. This could involve:

a. strengthening the institutional structures, including coordinating mechanisms that assist in the development and application of integrated approaches to the protection and management of land resources;

b. strengthening of the legal framework and regulations related to development and protection of land resources; improvement of enforcement procedures;

c. further development of economic instruments that assist in the protection and management of land resources;

d. development of improved incentive structures to support appropriate land use;

e. further application of procedures to facilitate participation of all actors in the decision-making and implementation process; development of innovative approaches that allow more direct and active participation at all levels;

d. institutionalizing an integrated approach to land resources, which would entail the building up of all the institutional structures, machineries and processes at the national level.

21. Development of a more responsive and appropriate planning and management system is another element in the putting in place of an improved system for decisions on land resources. This would take place essentially at the national level, and could involve, among other things, setting in place policies, procedures and bodies for land use planning at the national, regional and local levels.

22. Improvement and further development of the tools to support the planning and management process is an essential action, without which decisions on land use can not be appropriate. In all cases actions here should be supported by research, pilot applications, wide dissemination of experiences and training. Application at the national level is the end point, and this process can greatly be assisted by the international community, which has a major support role to play. The main elements could include:

a. strengthening of existing assessment systems including those to gather environmental, economic and social data at the global, regional, national and local levels; and development of new systems where necessary; development of improved and compatible systems for integration, analysis, interpretation and presentation of data;

b. improvement and wider application of techniques and procedures for assessing impacts, risks and costs and benefits of specific actions;

c. further development and application of methods to assign values to environmental resources; further development and wider application of methods for resource accounting;

d. strengthening of existing methods for environmental and developmental management; research on and application of appropriate traditional and indigenous methods; development of new alternatives to existing systems and methods; research and development of new and improved methods, techniques and inputs to the development and management of land resources; wide dissemination and application of alternatives.

23. Strengthening and building the capacity to act is fundamental, without which none of the above actions can take place. Action in this area would entail the setting up of a massive and concerted effort for education and training and the transfer of technologies and techniques.

24. Conducting research, developing pilot projects and exchanging experiences on the process of integrated planning and management and of the results obtained would be useful.

C. SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT

Basis for Action

25. The options for action presented here are based on the proposed International Cooperative Programme Framework for Sustainable Agriculture and Rural Development (ICPF/SARD) prepared by FAO. A full version is held by the UNCED Secretariat. This programme is in turn based on the Den Bosch Declaration and Agenda for Action for Sustainable Agriculture and Rural Development agreed at the FAO/Netherlands Conference on Agriculture and the Environment (Den Bosch, 15-19 April 1991). This Conference called for an international cooperative programme to meet the needs of SARD at national and international levels, and the FAO is at present taking steps to develop this programme in detail.

Objectives

26. The programme area could have three essential objectives, namely (a) food security by ensuring an appropriate and sustainable balance between self-sufficiency and self-reliance; (b) employment and income generation in rural areas, particularly to eradicate poverty; (c) natural resource conservation and environmental protection.

Proposed programme areas

27. A first approximation is made here of a comprehensive programme framework to meet these three objectives, for the consideration of the Preparatory Committee:

C.1 Sector policy review, planning and programming;

C.2 People's participation and development of human resources:

C.3 Integrated production systems management and diversification of rural incomes;

C.4 Land Resources Conservation and Management, including two subprogrammes on land use planning and land conservation and rehabilitation; 1/

C.5 Water resources for agriculture; 2/

C.6 Genetic Resources for Agriculture, including two subprogrammes on plant genetic resources and animal genetic resources; 3/

C.7 Integrated Pest Management for Agriculture; 4/

C.8 Sustainable Plant Nutrition; 5/

C.9 Rural Energy. 6/

C.1 SECTOR POLICY REVIEW, PLANNING AND PROGRAMMING

Basis for Action

28. There is a need to integrate sustainable development considerations with agricultural policy analysis and planning in developing countries. The recommendations should contribute directly to development of realistic and operational medium- to long-term plans and programmes, and thus to concrete actions. Support to and monitoring of implementation should follow.

Objectives

29. The major objectives of this programme would be: (a) strengthening of Ministry of Agriculture and/or Ministry of Planning or other appropriate institutions, in terms of financial as well as human resources; (b) strengthening the supporting information and higher education systems in the countries. This includes the information system for policy, planning and monitoring, institutional diagnosis for policy and strategy preparation and implementation and for project formulation; and (c) regional and international cooperation for the exchange of information and experience or incorporation of environmental and sustainable development considerations in sectoral policy analysis.

Activities

30. The activities would focus on reviewing the relationship to sustainable agricultural development of:

a. key macroeconomic variables, e.g. foreign trade policies, price policies (including subsidies), interest rate, exchange rates, structural adjustment programmes, etc.

b. population growth and distribution trends;

c. food security;

d. database and information systems;

e. natural resource use and impact of policies;

f. environmental considerations (e.g. major areas of environment concerns, land tenure policies, etc); and

g. national capabilities in SARD policy analysis, formulation and monitoring.

31. Based on the above analysis, sector review to recommend actions for integration of environment and sustainable development considerations into agricultural policies could be undertaken, and finance and human resources implications identified. The follow-up implementation could include:

a. Activities based on policies for sustainable agricultural development;

b. Activities for developing a capacity for SARD policy analysis, including institutions strengthening, training and monitoring and evaluation.

C.2 PEOPLES PARTICIPATION AND DEVELOPMENT OF HUMAN RESOURCES

Basis for Action

32. This component bridges policy and integrated resource management. People-centred rural development is the foundation for sustainability; the greater the degree of community control over the resources on which it relies, the greater will be the incentive for human resources development. At the same time, policy instruments to reconcile long-run and short-run requirements must be set by the national Government. The approaches focus on fostering self-reliance, cooperation, providing information, and supporting user-based organizations.

33. The stress is on change in management practices, building agreements for changes in resource utilization: the rights and duties associated with use of land, water and forests, the functioning of markets, prices, and the access to information, capital and inputs. This would require training and capacity building to assume greater responsibilities in sustainable development efforts.

Objectives

34. The main priority objectives could be: (a) the development of decentralization policies for rural development; (b) the concurrent adjustment of institutions; (c) the development of rural organizations and of the interactive processes with government institutions; and (d) development of human resources for the above purposes.

Activities

35. Information and capacity-building, with an emphasis on the role of voluntary organizations (VOs) in promoting power-sharing between central authorities and the local level. A major task would be to gather information on human resources, institutions and the roles of Governments, local communities and VOs in social innovation.

36. National programmes to mobilize people and institutions towards full participation in achieving the local goals of sustainable agricultural and rural development. Support for this would include information collection and

analysis; organization of farming population; re-organization or strengthening of rural institutions including farmers' cooperatives, agricultural extension services, technical and professional training, applied research and programme development.

37. Support to non-formal education or extension and technology transfer to farm populations. Investment would be required to augment existing infrastructures for human and institution development, particularly in environmentally fragile and neglected zones.

C.3 INTEGRATED PRODUCTION SYSTEM MANAGEMENT AND DIVERSIFICATION OF RURAL INCOMES

Basis for Action

38. Agriculture needs to be intensified to meet future demands for commodities and to avoid further expansion onto marginal lands and encroachment on fragile ecosystems. Increased use of external inputs and development of specialized production systems tend to increase vulnerability to environmental stresses and market fluctuations. There is, therefore, a need to intensify agriculture by diversifying the production systems for maximum efficiency in the utilization of local resources while minimizing environmental and economic risks. Where intensification of farming systems is not possible other opportunities could be identified and developed (cottage industries, wildlife utilization, aquaculture and fisheries, etc.).

Objectives

39. The main objectives of the programme are to improve sustainable farm productivity, raise income, reduce risks and increase the welfare of rural families. The programme could focus on understanding farmers' circumstances and seeking their active involvement in improving their income and living conditions. Its emphasis could be on technology development for sustainable production systems based inter alia on the indigenous technologies and the use of biological and ecological processes. The efficient utilization of external inputs could be maximized and their use and impact on the environment minimized. The programme will focus on the improvement of living conditions.

40. The production systems management programme could enable a systems approach to identification, formulation and implementation. The overall scope is loosely defined to facilitate the inclusion of a variety of production systems (e.g. agro-forestry, aquaculture, and inland fisheries).

Activities

41. Preparation and implementation of programmes for Integrated Production Systems Management and Rural Income Diversification. The approach could be participatory, relying on involvement of rural people and building on their experience, aspirations and resource endowments. It would seek to decentralize decision-making by providing incentives and resources for initiatives by local communities and by enhancing their status and management capacity, including that of women.

42. Implementation of farming systems development methodologies will look for technologies and crop, livestock and tree systems which use available biological diversity, promote biological control of pests and weeds and draw on multiple sources of nutrients. This would be achieved through dialogue with rural communities, farm surveys, on-farm testing of technologies and farm management methods. The effects of technical innovations and incentives on farm-household incomes and well-being will be analysed.

43. Flexible programmes and projects to address specific constraints and needs of agro-ecological zones. Linkages with other ICPF/SARD programmes could be developed, in particular with those related to input and output marketing systems, credit and small rural industries. The approach would result in a set of sustainable (socially, ecologically and economically viable) crop and livestock systems which are replicable and can be extended through credit and investment programmes.

C.4 LAND RESOURCES CONSERVATION AND MANAGEMENT

44. This ICPF/SARD Programme is constituted by two components, which are also related to Agenda 21's action to control land degradation: (i) Land use planning and (ii) Land Conservation and Rehabilitation. This programme is related to the item on an integrated approach to planning and management of land resources described in cluster B. above.

i - Land Use Planning

Basis for Action

45. Inappropriate and uncontrolled land uses are a major cause of degradation and depletion of land resources. Present land use often disregards the actual potentials, carrying capacities and limitations of land resources as well as their diversity in space. In the future, the need to increase food production to meet the needs of a population expected to double over the next 60 years will enormously increase the pressure on all natural resources, including land. Many of the technical solutions are known and if they can be efficiently applied, needs could be met, living standards raised and the quality of life improved on a sustainable basis for the world's population. What are lacking are the methods, the knowledge of land resources potentials and limitations, the human resources capacities and institutional structures as well as the political will to enable wise decisions to be made at all levels regarding the allocation, management and conservation of land resources and the monitoring of land use.

Objectives

46. Functioning systems could be in place by year 2000 at international, national and local levels to ensure optimum allocation of land and related resources for competing needs, as an essential basis for the design and application of integrated and comprehensive development programmes within each ecological zone, region or combination of physical, social and economic conditions. At each level, such a system would consist of three major

components: information gathering and storage; application of methods and techniques for using the information to select and design land uses; and an appropriate institutional framework.

Activities

47. The following sequence could be applied at each level (national, provincial, local):

a. Establishment and development of appropriate bodies responsible for land resources planning, conservation and monitoring, and the necessary linkages between them.

b. Establishment and development of the necessary technical capacities to support these bodies for land resource evaluation, land zoning, land use planning, land use monitoring and control;

c. Establishment at each level of the appropriate methodology and procedures to identify development planning zones on ecological, physiographic, administrative, social and economic grounds; collect the necessary information for planning and programme development purposes; establish data storage systems; identify land use options in terms of products, production systems, input/output relationships, environmental impact; selection of the optimum combination of options in relations to goals and objectives; design of the implementation programme, including the necessary policy, economic and legal framework; provision of additional funds, if required; monitor the conditions and status of land, water and other natural resources.

d. Establishment at each level of the necessary consultative process with land users for the elaboration and acceptance, after modification, of the proposed programmes, with their attendant policies legal and economic instruments.

ii - Land Conservation and Rehabilitation

Basis for Action

48. Land degradation, particularly soil erosion, is now the most widespread and, arguably, the most important environmental problem facing developing countries. The problem is serious because the productivity of huge areas of land is declining just when populations are increasing rapidly and the demand on the land to produce more food, fibre and fuel is growing. Efforts to control land degradation in most developing countries have had only limited success to date: generally, these efforts have not been sustained and they have been too small in scope to have had very much impact. Well-planned, long-term national and regional land conservation and rehabilitation programmes with strong political support and adequate funding are now needed. While land use planning and land zoning should provide long-term solutions to the land degradation problems, it is urgent to arrest land degradation and launch land conservation and rehabilitation programmes in the most critically affected or vulnerable areas.

49. FAO's programme for "The Conservation and Rehabilitation of African Lands" and similar schemes planned for Asia and the Pacific, and Latin America and the Caribbean will provide a framework for action and collaboration between participating countries, donor organizations, technical assistance agencies and development banks. But clearly, much work will have to be done in developing national policies and strategies, training, research and in the actual implementation of programmes. To be effective, the programmes will require strong political and institutional support, adequate numbers of trained staff and a considerable amount of money.

Objectives

50. The national programmes can only increase in numbers, size and scope as staff are trained, experience is gained and institutions are developed. The main objectives in each country could be the assessment, mapping and monitoring with particular attention to most critical areas; development of national policy, priorities, programmes and strategies for land conservation and rehabilitation; development of related research capacities and implementation capacities, including staff training; establishment of a field advisory support service to land users (including staff training); launching rural community-led programmes of land conservation and rehabilitation.

Activities

51. National action could include:

a. improving the national inventory of land resource conservation and rehabilitation requirements, establishment of a land resource degradation database, investigation of causes of land misuse and identification of priorities;

b. encouraging participation by helping land users to launch programmes of land conservation and rehabilitation, organizing demonstrations providing technical advice and training and promoting awareness of land productivity and conservation issues;

c. developing national institutions to support high level advisory commission for land resource conservation and rehabilitation, strengthen government conservation services, encourage work of NGOs, create legal framework, review workforce and training programmes, identify research needs and develop nation-wide land conservation programmes.

52. Regional networks can facilitate experience sharing and provide effective information exchange, advanced training in specialized areas and cooperation in conservation research.

53. At international level, long-term financial support would need to be assumed and coordinated work organized between technical assistance agencies, financing institutions and NGOS.

C.5 WATER RESOURCES FOR AGRICULTURE

Basis for Action

54. Agriculture is the main user of fresh water. Yet in many areas it is the limiting factor to increased agricultural production because of shortages, excess or waste. Water wastage in agriculture is not only one of the main causes of unsustainable production but also a cause of land degradation (erosion, waterlogging, soil salinization), water pollution, water-borne diseases, disasters (floods) and other environmental problems. Most present irrigation systems do not meet the criteria of sustainability. This programme is related to action under Freshwater Resources presented to the Preparatory Committee and to the Dublin Conference on Water and the Environment.

Objectives

55. The overall objective of the International Action Programme on Water and Sustainable Agricultural Development (IAP-WASAD) is to assist in the achievement of sustainable agricultural development through optimum use and conservation of water. More specifically, the objectives of the programme are to assist Governments to develop or update a national water use policy within the framework of the overall economic and agricultural development plan, recognizing the demand for freshwater by other economic sectors; develop an integrated agricultural water use and conservation strategy to support sustainable agricultural development, encompassing crop and livestock production, fisheries, forestry and other intersectoral issues related to agricultural development; formulate and implement sustainable water programmes aimed at fulfilling the national goals of food security and self-reliance, import substitution, crop diversification, etc.; strengthen institutions and develop human resources to support national programmes on agricultural water use and conservation.

Activities

56. A programme at regional, subregional and country levels would enable comprehensive planning, inter-sectoral collaboration, identifying projects that support one another, minimize overlap and conflicts, and ensure optimum utilization of financial and human resources. The elements of this programme could be:

a. National water use policy would include estimation of the nation's total surface and groundwater resources and allocation of water to the agricultural sector, including the re-use of wastewater, water legislation, water rights and water conservation.

b. Agricultural water use and conservation strategy would include rainfed agriculture and irrigated farming in food production; large-scale versus small-scale water programmes; conservation programmes to support rainfed agriculture, livestock production, aquaculture and agro-forestry; rehabilitation of existing irrigation projects and development of new ones.

c. Development and implementation of water programmes, would include evaluation of irrigation and rainfed agriculture development projects; feasibility studies and projects to rehabilitate existing projects or develop new projects; introduction of new technologies to increase crop yields and water use efficiency; prevention and control of waterlogging and salinity, including studies and pilot projects in reclaiming waterlogged and saline areas; protection against agricultural and industrial pollution as well as intrusion of sea water; feasibility of safe use of treated municipal effluent in crop production and recharge of aquifers and pilot projects in this area; water harvesting; programmes to predict and manage drought.

d. Institutional strengthening and human resources development would include review and strengthening of institutions that support water resources development programmes; development of mechanisms for inter-sectoral collaboration; adaptive research, data collection, monitoring and extension services; review and development of existing human resources; increase the number of trained persons; develop technical guidelines and extension bulletins to support development programmes.

C.6 CONSERVATION AND UTILIZATION OF GENETIC RESOURCES

Basis for Action

57. This Programme is part of a set of activities on biodiversity conservation and use for food, agriculture, forestry and fisheries and of the overall International Cooperative Programme Framework for SARD. It contributes to addressing the issue of food security. This programme includes plant and animal genetic resources and is therefore described as two separate components, and is related to actions presented to the Preparatory Committee under Biological Diversity.

i - Plant Genetic Resources for Sustainable Agriculture

Basis for action

58. Plant genetic resources (PGR) are an essential resource to meet future needs for food. Threats to the security of these resources are growing and efforts to conserve and use genetic diversity are underfunded and understaffed. Genebanks provide inadequate security and in some instances, the loss of plant genetic diversity in genebanks is as great as it is in the field. Therefore, there is an urgent need to strengthen global initiatives for security and sustainable use of plant genetic resources.

Objectives

59. The primary objective is to safeguard the world's priceless heritage of genetic diversity, while preserving it to use sustainably in future. This includes the development of international agreements to facilitate the conservation and use of plant genetic resources, networks of ex situ base collections and in situ conservation areas; Global Information and Early Warning Systems on PGR; the State of the World's PGR; a Global Plan of Action on Plant Genetic Resources; and an International Fund for PGR. Special

emphasis could be placed on the characterization, evaluation and utilization of PGR particularly for the minor crops and other underutilized or non-utilized species of food and agriculture, including tree species for agro-forestry.

60. Subsequent action could be aimed at consolidation and monitoring of the networks of ex situ and in situ conservation; further evaluation and use of plant genetic resources; realization of equitable sharing of benefits from the use of plant genetic resources.

Activities

61. The main activities could focus on:

a. the development and strengthening of institutional capacity, structures and programmes for conservation and use of PGR;

b. establishment of ex situ base collection networks;

c. strategies for in situ conservation areas;

d. establishment of global information and early warning systems on PGR;

e. preparation of periodic State of World's Report on PGR;

f. organization of a Fourth International Conference on PGR;

g. preparation of a rolling global Plan of Action on PGR;

h. development of mechanisms to realize Farmers' Rights;

i. development of further legal instruments, as appropriate;

j. strengthening of research on PGR utilization with the objectives of sustainable agriculture and rural development in view;

k. development of multiplication/propagation, exchange and dissemination facilities for PGRs (seeds and planting materials); monitoring, control and evaluation of plant introductions.

62. Further analysis of needs and gaps in the Global System on PGR; Consolidation of activities and monitoring progress will be needed subsequently.

ii - Animal Genetic Resources for Agriculture

Basis for action

63. The need for increased quantity and quality of animal products and for draught animals calls for conservation of the existing diversity of animal breeds to meet future requirements, including those for use in biotechnology. Some local animal breeds have unique attributes for adaptation, disease

resistance and specific uses, which in addition to their socio-cultural value should be preserved. These local breeds are threatened by extinction as a result of the introduction of exotic breeds and of changes in livestock production systems.

Objectives

64. The breeds of major farm animals and domesticated grazing animals, should be preserved through in situ and mostly ex situ preservation facilities. These breeds should be characterized and evaluated. Genetic material and related information should be stored and made accessible to users. Staff should be trained in conservation and use of animal genetic resources. Presently under-utilized breeds, including those of semi-domestic animals, should be more widely exploited.

Activities

65. At national level, preparation and/or completion of national inventories of available animal genetic resources. Cryogenic storage could be given priority over characterization and evaluation. Training of nationals in conservation and assessment techniques would be given special attention.

66. Further development of Regional Animal Gene Bank capacities to store material and support the above national activities is necessary. Regional assessment and monitoring of breeds flow across national boundaries could be promoted. Information and genetic material exchange with national programmes and other regional banks and feeding data to the Central Data Bank could be further developed.

67. At the global level, priorities could be: processing, storage and analysis of animal genetic data; this would include production of a World Watch Kit and Early Warning of endangered breeds; global assessment, scientific and intergovernmental guidance of the Programme and review of regional and national activities; development of methodologies, norms and standards (including international agreements), monitoring of their implementation and related technical and financial assistance.

C.7 INTEGRATED PEST MANAGEMENT IN AGRICULTURE

Basis for action

68. World food demand projections indicate an increase by 50 per cent by the year 2,000; more than double again by 2050. Conservative estimates put crop losses caused by pests between 25 and 50 per cent. Pests affecting animal health also cause heavy losses and in many areas prevent livestock development. Chemical control of agricultural pests has dominated the scene but its overuse had adverse effects on the farm budgets, human health and the environment as well as international trade. New pest problems continue to develop. Integrated Pest Management which combines biological techniques, genetic resistance, and appropriate farming practices and minimizes the use of pesticides is the best option for the future, as it guarantees yields, reduces costs, is environmentally friendly and contributes to the sustainability of agriculture. Integrated Pest Management should go hand in hand with the

establishment of appropriate pesticide management to allow for pesticide regulation and control including of trade, and for the safe handling and disposal of pesticides particularly those that are acutely toxic and persistent. This programme is related to action under toxic chemicals presented to the Preparatory Committee.

Objectives

69. By the year 2000 each country could have reliable plant protection and animal health services; integrated pest management techniques within the reach of farmers; mechanisms to control distribution and use of pesticides; and for the implementation of other aspects of the FAO International Code of Conduct on Pesticides; operational and interactive networks among farmers, research and extension services for the promotion of integrated pest management; under the sponsorship of FAO and in cooperation with other research institutions and the aid-providing institutions, a consultative process should be in place to respond to national and regional needs to develop integrated pest management programmes.

Activities

70. These could include:

a. Development of national systems and institutional capacities to control the import, distribution and use of pesticides;

b. Formulation and implementation of strategies for integrated pest management systems which will aim at improving yields, farmers' profitability and minimizing the impact of pesticides on human health and the environment;

c. Strengthening of national agricultural research and extension programmes and involvement of farmers to deal effectively with integrated pest management issues;

d. Strengthening of the international agricultural research system to support countries with information, technologies, training, institutional strengthening leading to a comprehensive programme on components of integrated pest management;

e. Advice to international, regional and national programmes in the development and application of integrated pest management for those crops where there is pesticide overuse;

f. Adoption of policies to phase out the use of acutely toxic and persistent pesticides and to discontinue any form of direct or indirect subsidy on the purchase and utilization.

C.8 SUSTAINABLE PLANT NUTRITION

Basis for Action

71. Plant nutrient depletion in developing countries is serious and therefore it is important to maintain soil productivity. To do this it is desirable to reinforce by FAO's sustainable plant nutrition programme. In Sub-Saharan Africa, nutrient output from all sources currently exceeds inputs by a factor of 3 or 4, the net loss being estimated at some 10 million tonnes per year. As a result more marginal lands and fragile natural ecosystems are put under agricultural use, thus creating further land degradation and other environmental problems.

Objectives

72. The programme has to be seen in the framework of the "Integrated Plant Nutrition Systems" (IPNS), an approach which is economically viable, environmentally sound and socially acceptable. It would aim at ensuring a sustainable supply of plant nutrients to increase future yields without harming the environment, thus maintaining national soil productivity. It would seek to optimize possible plant nutrient sources, organic (including biological nitrogen fixation) and mineral, in an integrated approach. The objectives of the programme could be to increase and sustain soil productivity to meet present and future demands; and to enhance the quality of land resources, and protect water resources, avoiding plant nutrient depletion.

Activities

73. This programme could study plant nutrient depletion and its impact on soil productivity; formulate national strategies and targets for the maintenance and improvement of soil productivity; alternative options for plant nutrient supply to meet projected demand; practices to increase the efficiency of plant nutrient applications; national fertilizer policies.

74. Activities could be undertaken within country and/or regional projects in three phases:

a. an average six-month phase study to establish the status of the soil fertility and plant nutrient depletion and the sustainability of current plant nutrition practices and techniques, and to formulate national strategies and proposals for sustainable plant nutrition;

b. a ten-year project of technology development and dissemination, leading to capacity-building and supply of plant nutrients (soil amendments and mineral fertilizer) to counteract plant nutrient depletion and enhance agricultural production on a sustainable basis. This second phase would gradually lead to a third interactive process involving farmers, research and extension services. Such projects could be implemented on an individual country basis, subregional level, subcontinent level or specific group of countries.

C.9 RURAL ENERGY

Basis for Action

75. Energy supplies in developing countries are not commensurate with their development needs, are highly priced and unstable. In rural areas, the chief sources of energy are fuelwood, crop residues and manure, together with animal and human energy. More intensive energy inputs are required for increased productivity of human labour and for income-generation. To this end, rural energy policies and technologies should promote a mix of fossil and renewable energy sources that is itself sustainable and ensures sustainable agricultural development. Rural areas provide energy supplies in the form of wood. The full potential of agriculture and agro-forestry, as well as common property resources, as sources of renewable energy is far from being realized. The attainment of sustainable rural development is intimately linked with energy demand and supply patterns. This programme is related to actions under Energy and Forests presented to the Preparatory Committee.

Objectives

76. Two types of projects would be required at the country level and municipal level with the objective of providing the necessary energy for household, agriculture and agro-industry needs; and to assist in the energy transition in rural communities from informal markets based on wood fuels to a better structured one based on more diversified sources of energy, not only for thermal energy, but also for power generation.

Activities

77. The proposed programme could be made operational by:

a. Establishment of a high level task force to prepare an Approach Paper for Rural Energy for the country. This phase may extend up to six months.

b. Preparation of micro-level pilot projects in one or more selected areas and preparation of area-based integrated rural energy plans and project documents for these areas.

c. Implementation of the pilot projects and development of a suitable institutional mechanism at the country level and in the selected areas to implement and monitor the projects. The two phases for preparation and implementation of the pilot projects may extend from 1-2 years.

d. Extension of the pilot integrated rural energy projects to other micro-regions in a phased manner, planning, implementation and monitoring of the integrated rural energy planning programme; organizing man-power development and training programme for professionals and others involved in the programme at different levels; introduction of the computer modelling system for the rural energy sector. This phase could eventually result in a regular operational programme.

Notes

1/ related to Agenda 21's action for an integrated approach to planning and management of land resources and to combat land degradation);

2/ related to Agenda 21's action on freshwater resources and the Dublin Conference on Water and the Environment)

3/ related to Agenda 21's action on Biological Diversity)

4/ related to Agenda 21's action on environmentally sound management of toxic chemicals)

5/ related to Agenda 21's action to combat land degradation, soil nutrients depletion and pollution of fresh water resources)

6/ related to Agenda 21's action on energy

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